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Comparing discourse performance according to elicitation procedure

Aimee Wheat
Eastern Illinois University

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Comparing Discourse Performance According to Elicitation Procedure

(TITLE)

BY

Aimee Wheat

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

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IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2006

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DEPARTMENT/SCHOOL HEAD

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DATE	THESIS COMMITTEE MEMBER

Comparing Discourse Performance According to Elicitation Procedure

Aimee J. Wheat

Eastern Illinois University

ABSTRACT

Four adolescents with closed head injury (CHI) and four matched controls provided speaking and writing samples using the following four elicitation procedures: pictured activity description, story retelling, procedural narrative, and personal narrative. The purpose of the current study was to compare discourse performance according to various elicitation tasks for adolescent with CHI and matched controls using measures of productivity, efficiency, and coherence. Additionally, the relationship between cognitive skills and discourse performance was assessed.

Results indicated that there was a significant difference between the participants with CHI and controls for oral productivity during the story retelling task. During this task, the controls were more productive, or expressed more ideas, than participants with CHI while speaking. There also was a significant difference between the two groups for global coherence ratings during the oral picture description task. The control group had higher global coherence ratings when compared to participants with CHI while speaking. There were no significant differences according to mode of discourse for either group. There were no significant differences on either verbal working memory scores or reading times from the Stroop; however, these group differences did approach significance. Although there were no significant differences between the groups, the control group performed better during each task.

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CHAPTER 1

Introduction

Discourse can be defined as communication of thought by words or any unit of connected speech or writing used to exchange ideas. Studies have concluded that individuals with closed head injuries (CHI) experience disrupted discourse. Over the past ten years, the popularity of using discourse analysis as a method for assessing communicative function in CHI has increased (Van Leer & Turkstra, 1999). Discourse analysis is used to better describe and identify communication impairments that are not revealed through traditional methods of language assessment (Van Leer & Turkstra). Researchers have studied discourse using a variety of elicitation procedures and discourse measures. However, there is little agreement regarding discourse elicitation or analysis procedures (Coelho, Youse, Le, & Feinn, 2003).

Narrative discourse has been used to assess communication in individuals with CHI and normals. A wide variety of procedures have been used to elicit oral and written discourse. Narrative discourse tasks may involve retelling of stories, providing personal narratives or procedures, and story generating tasks. Story retelling provides a general outline of information from a story that is heard to structure what is to be retold (Liles, Coelho, Duffy, & Zalagens, 1989). Personal narratives allow individuals to express their experiences to others. Personal narratives may be elicited through story prompts, family and work descriptions, discussions of familiar topics and activities, and generation of personal information. Procedural tasks involve the description of sequences in a familiar event. Story generating tasks allow individuals to produce a story by focusing on the events in a picture or series of pictures. Each task offers important information about an individual's skills and communication success in linguistically complex activities, but is somewhat different from one another in terms of the demands placed on the speaker (Stout, Yorkston, & Pimentel, 2000). Also, each task requires that the speaker demonstrate different abilities necessary for communication (Mentis & Prutting, 1987).

Cognitive impairments as a result of TBI, such as poor organization, memory, and attention can affect the quality of written or oral language (Manasse et al., 2000). Research has measured discourse through both oral and written modes. Each mode confronts the speaker/writer with its own set of demands, and can be characterized by its own internal structure and organization (Mentis & Prutting, 1987). Oral and written discourse may be differentially affected by CHI (Wilson & Proctor, 2002). Spoken discourse performance after TBI has been well documented, but written discourse has not received the same attention (Manasse, Hug, & Rankin-Erickson, 2000).

Measures used to analyze discourse have included productivity (Liles et al., 1989), efficiency (Smith, Heuerman, Wilson, & Proctor, 2003) and coherence (Smith et al., 2003). Productivity generally measures the amount of information provided and is typically measured in thematic units (TUs) and communication units (CUs). Efficiency can be defined as the average number of words used to express an idea and is measured by computing how many syllables or words are used to express each idea (MLCU= Mean Length of Communication Unit). Coherence refers to the connectedness of ideas.

A research study by Liles et al. (1989) analyzed the effects of elicitation procedures on the narratives of adults with CHI and control subjects. Story retelling and generation tasks were analyzed using a variety of measures. Results indicated that both groups produced significantly more TUs in the story retelling task than in the story generation task. The results showed that the type of elicitation task used affected productivity.

A research study by Wilson and Proctor (2002) compared the written discourse of adolescents with CHI to that of normal controls. The MLCU was used to measure efficiency. The results showed a significant difference on efficiency between the two groups and indicated that individuals with CHI use fewer words to express written ideas.

In a study by Van Leer and Turkstra (1999), participants were asked to orally provide a personal narrative and a current event narrative. Local and global coherence ratings were significantly higher in the personal event narrative when compared to the current event narratives for all subjects. The results indicated that the discourse elicitation tasks used in this study influenced the coherence of narratives in both adolescents with traumatic brain injury (TBI) and in normal individuals.

Chapman et al. (1992) proposed a model that illustrated three features necessary for discourse: linguistic structures, information structures, and information handling processes. Cognitive skills necessary for discourse included executive function, verbal working memory, and selective attention. Clinicians in rehabilitation have recognized the importance of executive functions for individuals with disability. The executive system is involved in formulating goals, planning to achieve them, carrying out the plans, and revising plans. All of these skills are necessary for effective discourse (Ylvisaker & DeBonis, 2000). An important aspect of executive functioning is verbal working memory. Researchers often discuss discourse in terms of verbal working memory (Dennis & Barnes, 1990; Smith et al, 2003; Wilson & Proctor, 2000). Working memory temporarily stores information while an individual concurrently processes incoming data and retrieves additional data from long term storage (Proctor, Wilson, Sanchez, & Wesley, 2000). Selective attention is required for effective discourse because ideas must be inhibited long enough for the speaker to formulate appropriate comments. Following a head injury, individuals are often impulsive, which results in unorganized or inappropriate expression of ideas.

Vakil, Weisz, Jedwab, Groswasser, and Aberbuch (1995) examined selective attention in patients with a closed head injury (CHI) using the Stroop color-word task. The control group performed faster on all tasks. This confirmed the hypotheses that the control group's reading time on the Stroop would be faster than that of the CHI group because of the CHI group's difficulty with inhibiting on the interference task.

Research has shown that persons with CHI often experience disrupted discourse. Findings of studies indicated that the results of comparisons between the discourse of CHI/normals vary according to discourse task. In order for discourse analysis to be an effective tool in the assessment and treatment of disordered discourse, a better understanding of the effect of elicitation task, mode of discourse, and cognitive skills should be gained.

The purpose of the current study was to compare the discourse performance of adolescents with head injury with matched controls on four different elicitation tasks. Oral and written discourse performance was measured in terms of productivity, efficiency, and coherence. Additionally, the relationship between cognitive skills and discourse performance was assessed.

CHAPTER II

Literature Review

Research has concluded that closed head injuries (CHI) or traumatic brain injuries (TBI) in children, adolescents, and adults disrupt discourse (Biddle, McCabe, & Bliss, 1996; Coelho, 2002; Stout et al., 2000; Van Leer & Turkstra, 1999; Wilson, Smith, & Proctor, 2001). CHI usually results from motor vehicle accidents. TBI includes CHI and other types of brain injury. Nearly all individuals with CHI/TBI sustain damage to the prefrontal areas of the brain (Wilson & Proctor, 2000). Individuals with damage to these areas of the brain often experience cognitive-communication disorders that can include disorganized and imprecise language.

Discourse Measures

Measures used to analyze discourse have included productivity (Liles et al., 1989), efficiency (Smith et al., 2003) and coherence (Smith et al., 2003).

Productivity.

Productivity of discourse can be measured in various ways. Liles et al. (1989) and Scott and Windsor (2000) used the thematic unit (TU) to measure productivity. Other studies such as Hartley and Jensen (1991), Smith et al. (2003), and Wilson and Proctor (2000, 2002) used a similar unit, the communication unit (CU) to measure discourse productivity. TUs and CUs were defined as independent clauses plus any associated dependent clauses (Liles et al., 1989). The TU was developed to analyze written samples and the CU was developed for oral and written analysis (Hughes, McGillivray, & Schmidek, 1997). TUs and CUs are the most frequently used productivity measures in discourse analysis. These units are more reliable than other criteria for measuring discourse productivity because they are grammatically based.

Wilson and Proctor (2000, 2002) compared the oral and written discourse of adolescents with CHI to that of normal controls using the "Cookie Theft" picture description task. The number of communication units (CUs) per narrative was used to measure productivity. When describing the "Cookie Theft" picture, participants with CHI were as productive as controls in written samples, and more productive in oral samples. These findings suggest that productivity varies according to mode of expression.

Efficiency.

Efficiency is another measure used in discourse analysis. Efficiency can be defined as the amount of information expressed about each idea and can be analyzed in various ways. Speirs and Dahlberg (1990) analyzed efficiency by counting the number of syllables in each new idea. This method of analyzing efficiency could be questionable because analysis could be impacted by the use of multi-syllabic words. Stout et al. (2000) measured efficiency by speaking rate (syllables per minute) and the rate at which relevant information was provided (concepts per minute). The mean length of communication unit (MLCU) is another efficiency measure used by researchers (Wilson & Proctor, 2000; Wilson et al., 2001). The MLCU is computed by counting the average number of words per CU.

A research study by Hartley and Jensen (1991) examined aspects of productivity in the narrative and procedural discourse of eleven individuals with CHI and twenty-one normal adults. Measures of productivity were speaking time, number of words, number of communication units, average number of words per communication unit (efficiency), syllables per second, and percent of syllables in mazes. Two narratives and one procedural oral discourse task were used to elicit samples from each participant. Results indicated that the subjects with CHI consistently produced fewer words to express verbal ideas when compared to controls.

A research study by Wilson and Proctor (2002) compared the written discourse of adolescents with CHI to that of normal controls. Efficiency measured the amount of speech (in words) used to convey a communication unit (MLCU). Small averages represented greater efficiency. When describing the "Cookie Theft" picture, participants with CHI used fewer words per CU (MLCU= 8.19) than controls (MLCU= 11.70). The results indicated a significant difference in efficiency between the two groups. This study also found that individuals used fewer words to express written ideas after a CHI. Research has consistently found that individuals with CHI produce fewer words to express ideas in discourse tasks.

Coherence.

Discourse has also been measured in terms of coherence. In a study by Van Leer and Turkstra (1999), participants were asked to orally provide a personal narrative and a current event narrative. Six individuals with TBI and six controls participated in this study. Coherence was defined as the appropriate maintenance of some aspect of the sample. Local and global coherence were rated according to a scale adapted from Glosser and Deser (1990). Global coherence was defined as the relationship of the meaning or content of each T-unit to the established topic of conversation. Local coherence was defined as the relation of the meaning of one T-unit to that of the immediately preceding

T-units. Results indicated that there was no significant effect of group, or group by task interaction, on any local or global coherence measure.

In 2000, Wilson and Proctor conducted a study that looked at coherence in oral and written discourse in adolescents with CHI. A generation task using a pictured stimulus was used to elicit discourse samples. A five-point global and local coherence scale was used, and ratings were assigned to the oral and written samples based on the relationship of each CU to topic (global) and to preceding and following CUs (local). The authors found a significant difference in the local coherence ratings for the oral and written discourse of patients with CHI when compared with normal controls. Within the CHI group, the ratings for local coherence were lower than either the global or local coherence ratings for normals.

Wilson and Proctor (2002) analyzed the coherence of written discourse for adolescents with CHI. Subjects included eight adolescents with closed head injury and matched controls. Participants were asked to provide written descriptions of a pictured activity. The study used traditional measures, as well as informal ratings of coherence. The researchers found that global coherence for the two groups was similar. However, the group with CHI received significantly lower ratings on local coherence than controls. The results indicated that the local coherence measure differentiated the writing skills of adolescents with CHI when compared to controls, while global ratings were similar.

Studies demonstrated that subjects with TBI either performed in a similar manner (Van Leer & Turkstra, 1999) or received lower local coherence ratings than normals for oral and written narratives (Wilson & Proctor, 2000). The difference may be accounted for by the stimulus task. Van Leer and Turkstra used personal and current event narratives and found no difference in local and global coherence ratings between subjects and controls. Wilson and Proctor (2000, 2002) found that oral and written samples of subjects with TBI received lower local coherence ratings when a picture description task was used.

Discourse Tasks

There is a general agreement regarding the clinical usefulness of discourse analyses for assessing communicative impairments in individuals with traumatic brain injuries. However, there is little agreement regarding discourse elicitation or analysis procedures Because of this, it has been difficult to compare findings across studies (Coelho et al., 2003).

A variety of elicitation procedures have been used to elicit oral and written discourse. The most common elicitation procedures include conversation, story generation, procedural description, story retelling, and picture description. Each task offers important information about an individual's skills and communication success in linguistically complex activities, but is somewhat different from others in terms of the demands placed on the person (Stout et al., 2000). Each discourse task requires a speaker to demonstrate different abilities that are necessary for communication (Mentis & Prutting, 1987).

Narrative discourse has been used in research studies of communication in children, adolescents, and adults with TBI. Studies found that individuals with TBI do not show a difference in their narratives at the word or sentence level when compared to control groups (Van Leer & Turkstra, 1999). Because of this, researchers began to analyze the organization and logical progression of ideas in discourse (Van Leer & Turkstra).

Narrative discourse tasks may involve retelling stories, providing personal narratives or procedures, and story generating tasks (Shadden, Burnette, Eikenberry, & DiBrezzo, 1991; Tucker & Hanlon, 1998). Story retelling provides an outline of information to structure what is to be retold (Liles et al., 1989). Personal narratives are elicited through story prompts, family and work descriptions, discussions of familiar topics and activities, and expression of personal information. Procedural discourse tasks involve describing sequences of familiar events, such as how to scramble an egg or how to go grocery shopping (Shadden et al., 1991). The main goal in a story generation task is to produce a story by focusing on the events in the picture with minimal expansion of the topic. Story generation tasks require organization and structure of the narrative (Stout, et al., 2000).

Story retelling tasks.

Liles et al. (1989) examined the effect of elicitation procedures on the narratives of four adolescents with CHI and twenty-three normal controls. Story retelling and story generation tasks were used to analyze discourse at levels of sentence production, intersentential cohesion, and story organization. In the story retelling task, subjects were asked to watch a picture story, *The Bear and the Fly* (Winter, 1976) presented by a filmstrip projector with no soundtrack. After the story, the subjects were asked to retell the story to the researchers. In the story generation task, subjects were presented with a copy of Norman Rockwell's painting, *The Runaway.* The subjects were asked to tell the researcher a story about the picture. Results indicated that the elicitation task impacted discourse production of both groups. All subjects produced longer narratives and more complete episodes in the story retelling task. The researchers suggested that story retelling may be a less demanding task than story generation.

In 2003, Coelho et al. elicited discourse samples from thirty-two adults with CHI and forty-three matched controls. Discourse samples included two story narratives (generation and retelling) and fifteen minutes of conversation. The purpose of the study was to investigate the accuracy at which discourse performance could predict group membership. During the story retelling task, the subjects were presented the picture story, *The Bear and the Fly* (Winter, 1976), shown by filmstrip projector. After watching the film, the subjects were asked to orally retell the story. Results showed that the story narrative did not reliably discriminate the CHI group from the control group. However, conversational tasks were more accurate in discriminating the groups than generation and retelling samples.

These research studies indicated that story retelling tasks produced longer and more complex discourse samples than generation tasks. Story retelling tasks did not reliably discriminate CHI groups from controls. Retelling provides structure for the narrative and was therefore less demanding for subjects with CHI.

<u>Personal narrative.</u>

Individuals relate their experiences to others through personal narratives. Research has shown that individuals with TBI are at risk for impaired narrative abilities. Biddle et al. (1996) examined narrative skills following TBI in children and adults. Participants included twenty individuals with TBI (ten children and ten adults) and twenty controls. Each subject was asked to describe a personal experience (personal narrative). Four narrative prompts were given to the children which included the following: "A pet does something funny," "A trip to an amusement park," "Getting lost," and "Being stung by a bee." Adult subjects also received four prompts that included the following: "Getting lost," "A broken bone," "A favorite experience with a child," and "Having a car accident." This research indicated that in personal discourse narratives, individuals with TBI showed errors in planning and organization of language.

Procedural tasks.

Procedural discourse tasks, like story generation tasks, require organization and structure in the narrative (Stout et al., 2000); however, procedural discourse tasks have an inherent organizational structure based on predetermined step-by-step instructions involved in the procedure. According to Ulatowska, Allard, and Chapman (1990), the principal difference between narrative and procedural discourse is that while the primary function of a narrative is to entertain, the main purpose of procedural discourse is to inform or instruct. Because of this, procedural discourse tasks may place greater demands on the speaker's ability to be precise in conveying information. Procedural discourse has not been as thoroughly researched as conversation and other narratives in adult neurological populations. In spite of this, it appears to be a commonly used assessment task in clinical settings.

In a study by Shadden et al. (1991), five oral discourse tasks (picture description, two narrative storytelling tasks, two procedural tasks) were analyzed using a variety of measures. Tasks included procedures for scrambling eggs and describing how to go shopping in a grocery store. Results indicated that the subjects were more productive in describing how to go shopping (29.91 ideas were provided) than when describing how to scramble an egg (10.62 ideas were provided). Results indicated that participants were more productive in the shopping procedural discourse task than in the picture description, two narrative storytelling tasks, and the egg procedural task. The results might have been influenced by the discourse task because describing how to go shopping required more detail than how to scramble an egg. These results indicated that the use of only one type of discourse task could over or under represent the communication abilities of individuals with brain injury. The data supported the hypothesis that all discourse tasks are not created equal.

Snow, Douglas, and Ponsford (1997) compared the procedural discourse skills of a group of twenty-six TBI speakers, with those of two control groups. One control group was comprised of twenty-six non-TBI orthopaedic patients. The other control group was twenty-six university students. Each participant completed the following four discourse tasks: conversation, procedural discourse, and two narratives. For the procedural task, each participant was asked to tell all the steps involved in withdrawing money from a bank account. The TBI group was compared with the control groups on content and productivity. The TBI group was found to differ significantly from the university control group with respect to productivity and the amount of "on-target" discourse. In procedures, the group with TBI was less productive, had insufficient information bits, poor topic maintenance, and information redundancy.

Snow et al. (1997) suggested that some procedural tasks may be held in an individual's procedural memory rather than generated as novel output. There is evidence that procedural memory may be relatively spared following TBI and this may be relevant to the way in which TBI speakers approach procedural discourse, as opposed to narrative, or conversational discourse. The researchers advised that caution needs to be taken in the use of procedural discourse tasks in the clinical setting and during the selection of rehabilitation goals.

Findings of these studies suggested that individuals with TBI may be more or less productive than controls depending on the task. When tasks are compared within the TBI group, some procedural narratives were more productive than picture description and story retelling tasks. Procedural narratives are demanding in the sense that they require more specific information than other discourse tasks. However, if procedural memory is relatively spared, TBI subjects may perform well on these tasks.

Story generating tasks.

Picture description may be a difficult cognitive task for some individuals because it requires the ability to determine where to begin and how to sequence the descriptive elements (Stout et al., 2000). An example of a picture description task is the "Cookie Theft" picture from the *Boston Diagnostic Aphasia Examination* (Goodglass & Kaplan, 1983). Many researchers have examined discourse from picture description.

A study by Liles et al. (1989) suggested that a picture description task requiring the generation of ideas was cognitively demanding due to the lack of structure provided for the development of ideas. Dennis and Barnes (1990), Stout et al. (2000), and Wilson and Proctor (2000) also suggested that pictured activity description tasks might be more demanding than other types of elicitation tasks. A picture description task requires the generation and elaboration of ideas as the picture is described.

Shadden et al. (1991) conducted a study on the effects of five elicitation tasks (i.e., two procedural discourse, two generation narratives about pictured activities, and story retelling) on the discourse of brain injured individuals. Subjects were less productive (said less) in the picture description than in the procedural narratives and were more efficient (used less words per idea) in the picture description than in the procedural narrative. This research concluded that the elicitation task affected length, type, and quality of a response. The authors suggested that more than one elicitation task should be used when analyzing discourse.

Researchers are in agreement that pictured description tasks result in less productive and more efficient discourse samples, suggesting that variation in the elicitation tasks impacted the discourse produced. Procedural discourse tasks, which required generation of ideas, were considered more cognitively demanding than routine procedures because of the need to develop a structure of ideas.

Oral and Written Discourse

Research has measured discourse through both oral and written modes because they are the basic mechanisms for communication. Written and spoken discourse serve to mediate ideas (Wilson & Proctor, 2002). Mentis and Prutting (1987) suggested that oral and written communication each confront the speaker/writer with unique cognitive, linguistic, and pragmatic demands. It has been suggested that writing requires more deep, meaningful processing, as well as more organization and planning than speaking (Wilson & Proctor, 2002). Effective oral discourse requires a listener, whereas, written discourse occurs without a listener. Other differences in oral and written discourse are in interaction and feedback (Lewis, O'Donnell, Freebairn, & Taylor, 1998). Oral discourse involves an interaction with another individual, and that individual provides the speaker with immediate feedback. In contrast, writing is a more independent process than speaking. It does not require interaction with another individual and immediate feedback is not provided. Oral discourse also involves paralinguistic cues such as facial expressions, gesture, and body language. The differing demands of oral and written discourse lead to the possibility that the discourse mode may be differentially affected by CHI (Wilson & Proctor, 2002).

Cognitive impairments such as poor organization, memory, and attention deficits, are associated with TBI and can affect the quality of written language (Manasse et al., 2000). Writing impairment occurs as a characteristic of a cognitive-language disorder. However, studies of writing by adults with cognitive language disorders following TBI are rare. Disruption of spoken discourse has been well documented, but written discourse has not received the same attention. Chapman, Levin, and Lawyer (1999) suggested that the written modality may be more vulnerable to the effects of severe brain injury than verbal expression. It has also been found that different elicitation tasks for written discourse, such as narratives or procedurals, place differential demands on a writer because of their specific organization and differing linguistic features (Mortensen, 2005).

Wilson and Proctor (2000) compared the oral and written discourse of adolescents with and without CHI. The researchers found differences for speaking and writing on a variety of measures. Measures of productivity and local coherence differentiated the oral discourse of adolescents with and without CHI. Results indicated that subjects with CHI spoke more about a picture, but had less connectedness between their sentences than the controls. In written samples, local coherence was the only measure that significantly varied between the two groups. Subjects with CHI received lower ratings on local coherence. This research suggested that the mode of discourse must be considered when analyzing discourse.

Modality of discourse has not been studied extensively. While Chapman et al., (1999) suggested that written discourse may be more affected than oral after TBI because of differing memory, organization, and attention demands, Wilson and Proctor (2000) found that written samples were less impaired than oral discourse.

Discourse performance has been shown to vary according to the measurements used, mode of discourse, and the elicitation task used. Therefore, all of these are important factors to consider when analyzing narratives.

Cognitive Factors in Discourse

Chapman et. al. (1992) proposed a conceptual model of discourse. The model included three parts necessary for discourse. The parts were linguistic structures, information structures, and information handling processes. The information handling processes require cognitive skills that are necessary for appropriate discourse. The cognitive skills include executive functioning, verbal working memory, and cognitive flexibility.

Executive functioning.

Clinicians in rehabilitation have recognized the importance of executive functions for individuals with disability. Frontal lobe injury is common in traumatic brain injury. Impaired executive functions may be one of the core disabilities in individuals with traumatic brain injury. The executive system is involved in formulating goals, planning to achieve them, carrying out the plans, and revising plans in response to feedback (Ylvisaker & DeBonis, 2000). All of these skills are needed in appropriate and effective discourse. Researchers have used discourse measures to identify disturbances in planning or organization impairment, common in frontal lobe dysfunction.

Verbal working memory.

An important aspect of executive functioning is verbal working memory. Working memory can be defined as the brain function that provides temporary storage and manipulation of the information necessary for cognitive tasks such as language comprehension, learning, and reasoning (Baddeley, 1992). In a broader term, working memory temporarily stores information while an individual concurrently processes incoming data and retrieves other data from long-term storage. Research has shown that one area frequently disrupted due to head injury is working memory (Proctor et al., 2000).

Dennis and Barnes (1990) analyzed four oral discourse tasks in thirty-three children and adolescents with CHI. The Recognition Memory Subtest of the *Goldman-Fristoe-Woodcock Auditory Memory Battery* (Goldman, Fristoe, & Woodcock, 1974) was used to measure the subjects' working memory. A significant correlation between verbal working memory and inference skills was found. Simple forms of scripts were used in the Making Inferences task. Scripts are mental representations that generate expectations and inferences about the way events proceed (Dennis & Barnes, 1990). In order for the subjects to make an inference about each script, an idea had to be held in memory so that the outcome could be evaluated with reference to it. Discourse performance requires similar skills because when presented with a discourse task, a person must hold the topic in mind while generating new ideas in reference to the topic.

Smith et al. (2003) investigated the oral and written discourse samples of twenty-five normal college students. Speaking and writing samples were analyzed according to productivity, efficiency, and coherence while considering the demands of mode of expression, task elicitation, cognitive distance, and verbal working memory. The Recognition Memory Subtest of the *Goldman-Fristoe-Woodcock Auditory Memory Tests* (Goldman et al., 1974) was used to measure verbal working memory. Each discourse sample was divided into top (S1) and bottom (S2) halves. Subjects were asked to speak and write about the "Cookie Theft" picture (pictured activity description) from the *Boston Diagnostic Aphasia Examination* (Goodglass & Kaplan, 1983) and a favorite or most memorable summer (personal narrative). For the first half of each discourse sample (oral and written), participants with a higher verbal working memory score usually had a higher MLCU, while for the bottom half of each discourse sample (oral and written) participants with a higher verbal working memory score tended to have a lower MLCU. That is, persons with higher verbal working memory scores demonstrated a pattern of using more words for each idea as discourse samples progressed. However, results indicated that there were no significant correlations between verbal working memory scores and productivity, efficiency, or coherence for oral or written samples.

Wilson and Proctor (2000) analyzed oral and written discourse of adolescents with CHI. Subjects included eight adolescents with CHI and eight matched controls. A picture description task was used to elicit discourse samples. Samples were analyzed according to eight measures. Results indicated that written productivity and written efficiency were among the measures which varied significantly according to scores on working memory for both groups. No significant relationships were found between oral discourse measures and verbal working memory scores. The researchers suggested that the mode of presentation (writing vs. oral) must be considered when analyzing discourse in regard to cognitive factors.

Selective attention.

Following a head injury, adolescents are often impulsive and fail to inhibit communication and behavior. For effective discourse, ideas must be inhibited long enough for the speaker to formulate appropriate comments. In discourse, impulsivity (poor selective attention) may result in unorganized or inappropriate expression of ideas. Several studies have tested selective attention in the head-injured population with the Stroop color-word test. Subjects are asked to respond to an interference task by naming colors that are contrary to their verbal content (e.g., the word "blue" printed in green ink).

In 1995, Vakil et al. tested different components of selective attention in CHI patients using the Stroop color-word task. Subjects included twenty-five individuals with a CHI (ages 18-48 years) and twenty-seven matched controls (ages 18-35 years). The experiment included the following four conditions: neutral, habituation, Stroop, and negative priming. The control group performed faster on all tasks. This confirmed the hypothesis that the control's group reading time was faster than that of the CHI group.

Summary

Discourse performance has been shown to vary according to the measurements, mode of discourse, and elicitation task used. Therefore, all of these are important factors to consider when analyzing narratives. Discourse performance has also been discussed in terms of selective attention and verbal working memory skills. Authors have suggested that additional cognitive and linguistic skills need to be identified when analyzing discourse productions.

The present study was initiated to investigate discourse performance across four discourse elicitation tasks, using oral and written samples and a variety of discourse measures. The inclusion of varied discourse tasks and measures allowed narratives to be evaluated and compared within one study. The study also included additional cognitive measures as they related to discourse.

The present study investigated the oral and written discourse performance of four adolescents with a head injury to matched controls. Performance was analyzed according to the elicitation procedure and mode of expression. Additionally, the relationship between cognitive skills and discourse performance was assessed.

The following research questions were addressed:

1. Is there a difference between participants with CHI and control subjects on measures of productivity, efficiency, and coherence in discourse samples elicited in different manners (i.e., pictured activity description, story retelling, procedural narrative, personal narrative)?
2. Do the measure of productivity, efficiency, and coherence vary according to oral and written modes of discourse between participants with CHI and control subjects?
3. Is there a difference between participants with CHI and control subjects on measures of verbal working memory and selective attention?

CHAPTER III

Methods

The purpose of this study was to compare the discourse performance of four participants with head injury to matched controls according to the influence of the elicitation task and mode of expression, using measures of productivity, efficiency, and coherence. The relationship of cognitive skills to discourse performance was assessed. The following is a discussion of participants in the study, procedures used for collection of samples, discourse analysis, and reliability.

Participants

Four participants who had sustained a closed head injury (CHI) during adolescence were selected to participate in the study. This age group was selected because young adults of this age (15-29) most commonly sustain CHI. The participants with CHI were recruited from the surrounding community. Participants were at least two years post injury and demonstrated skills necessary to speak and write. Potential participants who had a previous head injury or an identified neurological disorder were excluded from the study. Individual characteristics of participants with CHI are summarized in Table 1. The age of participants ranged from 19-28 years (mean age= 22.75 years) and included two males and two females. All participants were Caucasian and native English speakers.

The controls were matched to the participants with CHI according to gender, age, race, and socioeconomic status. Controls were also recruited from the surrounding area. Socioeconomic background was determined using the general education level of the

Table 1

Individual and Socioeconomic Information for Participants and Controls

Subject Number	Sex	Age at Testing	Education of Mother
Participants with Head Injury			
1	M	21	Ph.D.
2	F	28	M.S.
3	M	19	A.S.
4	F	23	HS
Controls			
5	M	21	M.S.
6	F	27	M.S.
7	M	19	A.S.
8	F	23	HS

Note: M= Male; F= Female; HS= High School Diploma; M.S.= Masters degree; A.S.= Associates degree; Ph.D.= Doctorate degree

mother. Entwisle and Astone (1994) have suggested that maternal education is a valid predictor of socioeconomic status. Individual characteristics of controls are summarized in Table 1. No control had a history of CHI, language, learning, or reading problem, or neurologic disorder. The present age range of controls was from 19-27 years (mean age= 22.5 years). There were two males and two female controls. The participants and controls were asked to sign an informed consent prior to assessment. A sample of the Informed Consent form is provided in Appendix B.

Hearing ability of participants and controls was within normal limits when screened at 25 dB at 1000, 2000, 4000 HZ bilaterally. Adequate vision was established by having the participants and controls accurately report information about a pictured activity. Ability to read was established by having the participants and controls read the Informed Consent form out loud before signing.

Testing

The *Scales of Cognitive Ability for Traumatic Brain Injury* (SCATBI, Adamovich & Hendersen, 1992) was administered to the participants with CHI to establish impaired cognitive linguistic function. The test assesses lower functioning (perception/discrimination, orientation, and organization) and higher functioning (recall, and reasoning) cognitive skills. A resulting severity score of 15 or below, reflecting below normal cognitive linguistic performance was necessary for inclusion in the study as a participant with CHI. SCATBI severity scores for participants are included in Table 2. Participant mean severity score was 11.25 (range= 9-13).

The *Peabody Picture Vocabulary Test 3rd Ed.* (Dunn & Dunn, 1997) was administered to the controls to establish normal receptive vocabulary skills. A standard score of 85-115 was necessary for inclusion in the study. Standard scores on the PPVT for controls are included in Table 2. The control group had a mean PPVT standard score of 112.25 (range= 101-121).

The "Recognition Memory Subtest" (RMT) of the *Goldman-Fristoe-Woodcock Auditory Memory Tests* (Goldman et al., 1974) was administered to the participants and controls to assess verbal working memory skills. The subjects were asked to listen to 110 words from an audiotape and indicate whether they had heard the words previously. The raw score is the total number of correct responses (110). Participant mean RMT raw score was 97.75 (range= 84-104). Control mean RMT raw score was 108 (range= 106-109). Participant and controls RMT raw scores and means are included in Table 2.

The *Stroop Test: Victoria Version* (Regard, 1981) was also administered to the participants and controls to assess selective attention skills. Subjects were asked to respond to an interference task by naming colors that are contrary to their verbal content (e.g., the word "blue" printed in green ink). Both the reading time and number of errors were recorded. Participant with CHI and control Stroop times and errors are provided in Table 2. Average participant with CHI Stroop time was 26.64 seconds (error mean= 1.25). Average control Stroop time was 16.31 seconds (error mean= 0.50).

Experimental Stimuli and Procedures

Each participant provided four oral and four written discourse samples. Participants were provided with ruled white paper and an ink pen. Oral narratives were taped-recorded. The discourse elicitation tasks included a pictured activity description, story retelling, procedural, and personal narrative. Elicitation procedures were counter balanced according to mode of expression and order of tasks.

Elicitation tasks.

1. The "Cookie Theft" picture from the *Boston Diagnostic Aphasia Examination* (BDAE, Goodglass & Kaplan, 1983) was used for the pictured activity description.

2. The "Shipwrecked" (Merritt & Liles, 1987) story was used to elicit a story retelling narrative. The story was played from audiotape.

3. The procedural narratives were elicited by asking the participants to describe their morning routine.

4. The personal narratives were elicited by asking the participants to describe their best summer.

Table 2

Test Scores for Participants with Closed Head Injury and Controls

Subject Number	SCATBI/PPVT	RMT	Stroop
CHI Participants			
1	13	100	18.88 sec. 0 errors
2	12	84	41.00 sec. 1 error
3	11	104	21.57 sec. 2 errors
4	9	103	25.12 sec. 2 errors
Group Mean	11.25	97.75	26.64 sec. 1.25 errors
Control Participants			
5	121	109	13.03 sec. 0 errors
6	101	106	17.88 sec. 1 error
7	115	108	18.34 sec. 1 error
8	112	109	15.97 sec. 0 errors
Group Mean	112.25	108	16.31 sec. 0.50 errors

Note: SCATBI= *Scales of Cognitive Ability for Traumatic Brain Injury*; PPVT= *Peabody Picture Vocabulary* Test; RMT= *Recognition Memory Test*; SD= Standard deviation

No time limit was placed on elicitation of discourse tasks. Verbal cues such as, "Can you tell me more?", were used to encourage expansion if less than four sentences were generated. Discourse samples were typed and analyzed according to procedures established by Wilson and Proctor (2002).

Transcription procedures.

The examiner typed the oral and written samples verbatim. The oral and written narratives were divided into communication units (CUs). A communication unit was defined as an independent clause with all of its modifiers. In oral and written samples, compound sentences conjoined with a coordinating conjunction (and, but, so, etc.) were identified as two separate CUs. An example of two separate CUs is as follows:

1. My alarm goes off.
2. And I wake up

An example of one CU is as follows:

1. We sat on the beach and went shopping there for about a week.

Discourse measures.

Each sample was analyzed for productivity, efficiency, and coherence. Productivity was computed by dividing samples into communication units (CU= independent clause with all its modifiers). Productivity was reported in total number of CUs for each sample. Efficiency was computed by dividing the total number of words in each sample by the number of CUs in that sample. Efficiency was reported as mean length of communication unit (MLCU) and indicated an average number of words used to express each idea. Global and local coherence were established for each sample using a 5-point rating scale developed by Smith et al. (2003) (See Table 3). Global ratings were as follows: 5= Ideas form integrated story about topic; 4= All CUs are on topic; 3= One CU strays from topic; 2= Two CUs stray from topic; and

Table 3

Coherence Assessment Scale

Global Coherence

5= Ideas form integrated story about topic

4= All CUs are on topic

3= One CU strays from topic

2= Two CUs stray from topic

1= Generally off-topic

Local Coherence

5= Ideas follow logical progression

4= Each CU is related to the preceding or following CU

3= One CU is not related to the preceding or following CU

2= Two CUs are not related to the preceding or following CU

1= More than two CUs are not related to the preceding or following CUs

Note: CU= Communication unit

1= Generally off-topic. Local ratings were as follows: 5= Ideas follow logical progression; 4= Each CU is related to the preceding or following CU; 3= One CU is not related to the preceding or following CU; 2= Two CUs are not related to the preceding or following CU; and 1= More than two CUs are not related to the preceding or following

CUs. Global coherence measures the relationship of each CU to topic, and local coherence measures the connectedness of successive CUs to each other.

Analysis.

Between and within group comparisons were made for each discourse measure using one-way ANOVAs.

Reliability.

Interrater reliability on discourse measures was completed by the researcher and supervisor on 100% of the samples. Reliability consisted of verifying the transcription of CUs and individually rating each sample for coherence. Agreement was present when a rating of ± 1 was achieved between two raters. Point-to-point agreement of 94% was achieved. When disagreements arose, the results were discussed until both examiners reached agreement prior to analysis.

CHAPTER IV

Results

The major focus of this research was to compare the discourse of adolescents with and without head injury according to the influence of elicitation task and mode of discourse. A total of four discourse measures were used for analysis. In addition, the relationship of cognitive skills to discourse performance was also assessed.

Quantitative Analyses

The first research question asked, "Is there a difference between participants with CHI and control subjects on measures of productivity, efficiency, and coherence in discourse samples elicited in different manners (i.e., pictured activity description, story retelling, procedural narrative, personal narrative)?

The second question asked if the oral and written discourse of adolescents with and without CHI were different. It was expected that a difference would be found between the two groups due to the varying cognitive demands of speaking and writing. Comparisons were made using the measures of productivity, efficiency, and coherence.

The third question investigated the difference between executive functioning skills (selective attention) and working memory skills in individuals with and without a CHI. Frontal lobe damage is an expected part of the sequelae after CHI and is associated with impaired executive functioning and working memory. This research question was designed to determine important relationships between these discourse skills and changes after CHI.

First Research Question

The first research question investigated the difference between participants with CHI and control subjects on discourse measures elicited in different manners. The performance of participants with CHI and controls was compared by computing an one-way ANOVA. A <.05 significance level was used. Summaries of statistical comparisons between discourse samples of the CHI and control groups are provided in Appendix A.

Second Research Question

The second research question evaluated whether the oral and written narratives of adolescents with CHI differed from those of controls on measures of productivity, efficiency, and coherence. The performance of participants with CHI and controls was compared by computing an one-way ANOVA between the group means on the above measures for oral and written discourse samples. A significant level of <.05 was used. A summary of statistical comparisons between the CHI and control groups is provided in Appendix A.

Discourse Performance of CHI and Controls according to Productivity

Pictured activity description.

When looking at the first research question, controls were more productive, or produced more CUs, than participants while speaking and writing, as compared to participants with CHI during the pictured activity description task (See Table 4); however these differences were not significant (oral $p = .202$; written $p = .100$). When speaking, the mean number of CUs per narrative produced by participants with CHI was 6.75 (range= 6.00-8.00, sd= .96) compared to a mean of 10.75 for controls (range= 6.00-18.00, sd= 5.50). In writing, the mean number of CUs per narrative for CHI participants was 5.00 (range= 3.00-6.00, sd= 1.41) and the mean for controls was 8.50 (range= 5.00-13.00; sd=

3.32). Overall, the control group produced more ideas during the pictured activity task while speaking and writing as compared to the control group.

When looking at the second research question, participants with CHI and controls were more productive while speaking than when writing during the pictured activity description task (See Table 4). This approached significance for the CHI group (p= .086), but not for the control group (p= .510). When speaking, the mean number of CUs per narrative that was produced by participants with CHI was 6.75 (range= 6.00-8.00, sd= .96) as compared to a mean of 10.75 (range= 6.00-18.00, sd= 5.50) for controls. In writing, the mean number of CUs per narrative for the CHI participants was 5.00 (range= 3.00-6.00, sd= 1.41) and the mean for controls was 8.50 (range= 5.00-13.00; sd= 3.32). While both groups spoke more about the picture, there were no significant differences between oral and written discourse.

Story retelling.

When looking at the first research question, controls were more productive, or expressed more ideas, than participants with CHI while speaking and writing during the story retelling task (See Table 4). These differences were significant for oral tasks (p= .030), but only approached significance for written tasks (p= .072). When speaking, the mean number of CUs per narrative that was produced by participants with CHI was 9.25 (range= 5.00-15.00, sd= 4.35) as compared to a mean of 19.75 (range= 12.00-25.00, sd= 6.02) for controls. In writing, the mean number of CUs per narrative for the participants with CHI was 7.50 ((range= 4.00-10.00, sd= 2.65) and the mean for controls was 16.25 (range= 10.00-27.00, sd= 7.59). Both groups were more productive during the story retelling task than any other elicitation task.

When looking at the second research question, both groups were more productive while speaking as compared to writing during the story retelling task (See Table 4); however, this difference was not significant (p= .517, p= .497). When speaking, the mean number of CUs per narrative produced by participants with CHI was 9.25 (range= 5.00-15.00, sd= 4.35) as compared to a mean of 19.75 for controls (range= 12.00-25.00, sd= 6.02). In writing, the mean number of CUs per narrative for the participants was 7.50 (range= 4.00-10.00, sd= 2.65) and the mean for controls was 16.25 (range= 10.00-27.00; sd= 7.59).

Personal narrative.

When looking at the first research question, controls were more productive than participants with CHI while speaking and writing during the personal narrative task (See Table 4); however, these differences were not significant (oral p= .379, written p= .166). When speaking, the mean number of CUs per narrative produced by participants with CHI was 7.00 (range= 2.00-16.00, sd= 6.16) as compared to a mean of 10.25 for controls (range= 7.00-14.00, sd= 2.99). In writing, the mean number of CUs per narrative for the participants with CHI was 5.25 (range= 3.00-8.00, sd= 2.63) and the mean for controls was 8.25 (range= 5.00-11.00, sd= 2.75). Both groups were more productive while speaking.

When looking at the second research question, both groups were more productive while speaking than writing during the personal narrative task (See Table 4); however, the difference was not significant (p= .362, p= .363). When speaking, the mean number of CUs per narrative produced by participants with CHI was 7.00 (range= 2.00-16.00, sd= 6.16) as compared to a mean of 10.25 for controls (range= 7.00-14.00, sd= 2.99). In writing, the mean number of CUs per narrative for the participants was 5.25 (range= 3.00-8.00, sd= 2.63) and the mean for controls was 8.25 (range= 5.00-11.00; sd= 2.75).

Procedural.

When looking at the first research question, controls were more productive than participants with CHI while speaking and writing during the procedural task (See Table 4); however, these differences were not significant (oral p= .186, written p= .105). When speaking, the mean number of CUs per narrative produced by participants with CHI was 4.75 (range= 4.00-5.00, sd= .50); in writing, the mean number of CUs per narrative was 4.25 (range= 2.00-5.00, sd= 1.50).

When looking at the second research question, participants with CHI were more productive while speaking than writing during the procedural task (See Table 4); however, differences were not significant for either the CHI group (p= .550) or control group (p= 1.000). When speaking, the mean number of CUs per narrative produced by participants with CHI was 4.75 (range= 4.00-5.00, sd= .50) In writing, the mean number of CUs per narrative for the participants with CHI was 4.25 (range= 2.00-5.00, sd= 1.50). Both groups performed in a similar manner for oral and written productivity in their procedural samples.

Discourse Performance of CHI and Controls according to Efficiency

Pictured activity description.

When looking at the first research question, participants with CHI used fewer words per each idea, or were more efficient, than controls while speaking and writing during the pictured activity description task (See Table 5). These

Table 4

Productivity as Measured by Mean Number of CUs (SD in parenthesis)

	Picture Description	Story Retelling	Personal Narrative	Procedural
Oral				
CHI	6.75 (.96)	9.25 (4.35)	7.00 (6.16)	4.75 (.50)
Control	10.75 (5.50)	19.75 (6.02)	10.25 (2.99)	8.50 (5.00)
Written				
CHI	5.00 (1.41)	7.50 (2.65)	5.25 (2.63)	4.25 (1.50)
Control	8.50 (3.32)	16.25 (7.59)	8.25 (2.75)	8.50 (4.20)

Note: SD= Standard deviation; CU= Communication unit; CHI= Closed head injury

differences approached significance (p= .086, p=.070). The MLCUs for oral and written samples of CHI were similar,8.57 (range= 7.00-12.00, sd= 2.40) for oral and 8.98 (range= 7.50-10.60, sd= 1.47) for written. Controls also had similar MLCUs for speaking, 11.19 (range= 10.14-11.94, sd= .86) and writing, 11.78 (range= 9.25, sd= 2.07). Overall, participants with CHI were more efficient than controls during the pictured activity description task.

When looking at the second research question, participants with CHI and controls were more efficient while speaking than writing during the pictured activity description task (See Table 5); however, the difference was not significant (p= .781, p= .614). The MLCUs for oral and written samples of CHI were similar, 8.57 for oral (range= 7.00-12.00, sd= 2.40) and 8.98 for written (range= 7.50-10.60, sd= 1.47). Controls also had similar MLCUs for speaking, 11.19 (range= 10.14-11.94, sd= .86) and writing, 11.78 (range= 9.25-13.88, sd= 2.07). Overall, participants with CHI were more efficient (produced fewer words per CU) than controls while speaking and writing.

Story retelling.

When looking at the first research question, participants with CHI used fewer words to express ideas (more efficient) while speaking as compared to controls during the story retelling task; however, controls were more efficient when writing as compared to participants with CHI (See Table 5). These differences approached significance for oral narratives (p= .080), but not for written (p= .538). The MLCUs for oral and written samples of CHI were similar, 8.02 for oral (range= 7.60-8.60, sd= .42) and 8.70 for written (range= 7.57-9.78, sd= .90). Controls also had similar MLCUs for speaking, 9.42 (range= 7.80-10.61, sd= 1.25) and writing, 8.24 (range= 6.78-9.38, sd= 1.08). Both groups used fewer words to express ideas during the story retelling task than any other elicitation task.

When looking at the second research question, participants with CHI were more efficient while speaking than writing, while the control group was more efficient while writing during the story retelling task (See Table 5). However, the difference was not significant (p= .224, p= .206). The MLCUs for oral and written samples of CHI were similar, 8.02 for oral (range= 7.60-8.60, sd= .42) and 8.70 for written (range= 7.57-9.78, sd= .90). Controls also had similar MLCUs for speaking, 9.42 (range= 7.80-10.61, sd= 1.25) and writing, 8.24 (range= 6.78-9.38, sd= 1.08).

Personal narrative.

When looking at the first research question, controls were more efficient when speaking then writing during the personal narrative; however, participants with CHI performed similarly to the controls on oral and written tasks (See Table

5) with no significant differences (oral $p= .723$, written $p= .910$). The MLCUs for oral and written samples of CHI were 14.21 for oral (range= 10.00-22.00, sd= 5.37) and 12.19 for written (range= 9.38-14.37, sd= 2.23). Controls had similar MLCUs for speaking, 12.79 (range= 6.86-18.86, sd= 5.38) and writing, 12.32 (range= 11.70-13.00, sd= .55). Overall, controls had similar MLCUs during this task while speaking and writing, while the participants with CHI were more efficient while writing.

When looking at the second research question, both groups were more efficient while writing than when speaking during the personal narrative task (See Table 5); however, the difference was not significant ($p= .972$, $p= .868$). The MLCUs for oral and written samples of CHI were 14.21 for oral (range= 10.00-22.00, sd= 5.37) and 12.19 for written (range= 9.38-14.37, sd= 2.23). Controls had similar MLCUs for speaking, 12.79 (range= 6.86-18.86, sd= 5.38) and writing, 12.32 (range= 11.70-13.00, sd= .55).

Procedural.

When looking at the first research question, the CHI group used fewer words to express ideas while speaking while the control group used fewer words to express ideas while writing during the procedural task (See Table 5); however, the differences were not significant (oral $p= .426$, written $p= .211$). The MLCUs for oral and written samples of CHI were 11.34 for oral (range= 7.20-15.60, sd= 4.45) and 15.09 for written (range= 6.40-21.50, sd= 6.31). The MLCUs for controls were 14.41 for oral (range= 6.20-18350, sd= 5.64) and 10.44 for written (range= 7.67-12.10, sd= 2.09).

When looking at the second research question, participants with CHI were more efficient while speaking than when writing, while the control group was more efficient while writing during the procedural task (See Table 5). However, the differences were not significant ($p = .369$, $p = .235$). The MLCUs for oral and written samples of CHI were 11.34 for oral (range= 7.20-15.60, sd= 4.45) and 15.09 for written (range= 6.40-21.50, sd= 6.31). The MLCUs for controls were 14.41 for oral (range= 6.20-18.50, sd= 5.64) and 10.44 for written (range= 7.67-12.10, sd= 2.09).

Table 5

Efficiency as Measured by Average Number of Words to Express each CU (SD in parenthesis)

	Picture Description	Story Retelling	Personal Narrative	Procedural
Oral				
CHI	8.57 (2.40)	8.03 (.042)	14.21 (5.37)	11.34 (4.45)
Control	11.19 (11.19)	9.42 (1.25)	12.79 (5.38)	14.41 (5.64)
Written				
CHI	8.98 (1.47)	8.70 (.90)	12.19 (2.23)	15.10 (6.31)
Control	11.78 (2.07)	8.24 (1.08)	12.32 (.55)	10.44 (2.10)

Note: SD= Standard deviation; CU= Communication unit; CHI= Closed head injury

Discourse Performance of CHI and Controls according to Global Coherence

Pictured activity description.

When looking at the first research question, controls had higher global coherence ratings when compared to participants with CHI while speaking and writing during the pictured activity description task (See Table 6). The differences between controls and participants were significant for oral tasks ($p = .024$), but not for written tasks (p= .207). The range of global ratings for the CHI group was 4.00-5.00 for writing (mean= 4.25, sd= .50). All participants with CHI received a rating of 4.00 while speaking. The range of global ratings for the control group was 4.00-5.00 for speaking (mean= 4.75, sd= .50) and 3.00-5.00 (mean= 4.75, sd= .50) for writing. Overall, the control group received higher global coherence ratings while speaking and writing when compared to the participants with CHI.

When looking at the second research question, participants with CHI and controls received similar ratings of global coherence while speaking and writing during the pictured description task (See Table 6). The differences on global coherence according to mode of discourse was not significant (p= .356, p= 1.000) for either group. The range of global ratings for the CHI group was 4.00-5.00 for writing (mean= 4.25; sd= .50). All participants with CHI received a rating of 4.00 while speaking. The range of global ratings for the control group was 4.00-5.00 for speaking (sd= .50) and 3.00-5.00 (sd= .50) for writing.

Story retelling.

When looking at the first research question, During the story retelling task, participants with CHI received lower ratings of global coherence while speaking and writing as compared to controls during the story retelling task (See Table 6); however, these differences were not significant (oral p= .134, written p= .356). The range of global ratings for the CHI group was 4.00-5.00 for speaking (mean= 4.50, sd= .57) and 4.00-5.00 for writing (mean= 4.75, sd= .50). All controls received a rating of 5.00 while speaking and writing. Ratings for the two groups were similar for oral and written tasks.

When looking at the second research question, participants with CHI received similar ratings of global coherence while speaking and writing during the story retelling task (See Table 6). The differences on global coherence according to mode of discourse was not significant (p= .537, p= 0.00) for either groups. The range of global ratings for the CHI group was 4.00-5.00 for speaking (mean= 4.50, sd= .57) and 4.00-5.00 for writing (mean= 4.75, sd= .50). Ratings for the two groups were similar for oral and written tasks. All controls received a rating of 5.00 while speaking and writing.

Personal narrative.

When looking at the first research question, participants with CHI and controls received the same global coherence ratings when talking and writing during the personal narrative (See Table 6) with no significance between the two groups (oral p= 1.000, written p= 1.000). Both groups received a mean rating of 4.25 while speaking (range= 4.00-5.00, sd= .50) and a mean rating of 4.50 while writing (range= 4.00-5.00, sd= .58).

When looking at the second research question, participants with CHI and the control group received similar ratings of global coherence while speaking and writing during the personal narrative task (See Table 6). The differences on global coherence according to mode of discourse were not significant (p= .353, p= .537) for either groups. Both groups received a mean rating of 4.25 while speaking (range= 4.00-5.00, sd= .50) and a mean rating of 4.50 while writing (range= 4.00-5.00, sd= .58). During this task, the participants with CHI and control group received the same global coherence ratings while speaking and writing.

Procedural.

When looking at the first research question, the participant and control groups received similar global coherence ratings while speaking and writing during the procedural task, (See Table 6) with no significant differences (oral p= .207, written p= .134). The range of global ratings for the CHI group was 4.00-5.00 for speaking (mean= 4.25, sd= .50) and 4.00-5.00 for writing (mean= 4.50, sd= .58). The range of global ratings for the control group was 4.00-5.00 (mean= 4.75, sd= .50) for speaking. All controls received a rating of 5.00 while writing.

When looking at the second research question, participants with CHI and the control group received similar ratings of global coherence while speaking and writing during the procedural task (See Table 6). The differences on global coherence according to mode of discourse was not significant (p= .537, p= .356) for either group. Ratings for the two groups were similar for oral and written tasks. The range of global ratings for the CHI group was 4.00-5.00 for speaking (mean= 4.25, sd= .50) and 4.00-5.00 for writing (mean= 4.50, sd= .58). The range of global ratings for the control group was 4.00-5.00 for speaking (mean= 4.75, sd= .50). All controls received a rating of 5.00 while writing.

Discourse Performance of CHI and Controls according to Local Coherence

Pictured activity description.

When looking at the first research question, controls had higher local coherence ratings when compared to participants with CHI while speaking and writing during the pictured activity description task (See Table 7); however these differences were not significant (oral p= .809, written p= .304). The range of local

Table 6

Global Coherence Ratings as Measured by Relationship of each CU to the Topic (SD in parenthesis)

	Picture Description	Story Retelling	Personal Narrative	Procedural
Oral				
CHI	4.00 (.00)	4.50 (.57)	4.25 (.50)	4.25 (.50)
Control	4.75 (.50)	5.00 (.00)	4.25 (.50)	4.75 (.50)
Written				
CHI	4.25 (.50)	4.75 (.50)	4.50 (.58)	4.50 (.58)
Control	4.75 (.50)	5.00 (.00)	4.50 (.58)	5.00 (.00)

Note: SD= Standard deviation; CU= Communication unit; CHI= Closed head injury
Global coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

ratings for the CHI group was 3.00-4.00 for oral (mean= 3.50, sd= .58) and 2.00-5.00 for writing tasks (mean= 3.25, sd= 1.50). One control did very poorly on this rating while speaking, resulting in a range of 1.00-5.00 (mean= 3.75, sd= 1.89), while for writing the range was 3.00-5.00 (mean= 4.25, sd= .96) for controls.

When looking at the second research question, participants with CHI and controls received similar ratings of local coherence while writing and speaking during the pictured description task (See Table 7). The differences on local coherence according to mode of discourse was not significant (p= .766, p= .654) for either group. The range of global ratings for the CHI group was 3.00-4.00 for oral (mean= 3.50, sd= .58) and 2.00-5.00 for writing (mean= 3.25, sd= 1.50). One control did very poorly on this rating while speaking, resulting in a range of 1.00-5.00 (mean= 3.75, sd= 1.89), while for writing the range was 3.00-5.00 (mean= 4.25, sd= .96) for controls.

Story retelling.

When looking at the first research question, participants and controls received similar local coherence ratings during the story retelling task while speaking and writing (See Table 7). Differences in ratings were not significant (oral p= .468, written p= 1.000). The range of local coherence ratings for the group with CHI was 3.00-5.00 for oral and writing (mean= 4.00, sd= .82). The range of local coherence ratings for the control group was 3.00-5.00 while speaking (mean= 3.50, sd= 1.00) and 3.00-5.00 for written tasks (mean= 4.00, sd= 1.15).

When looking at the second research question, participants with CHI and controls received similar ratings of local coherence while speaking and writing during the story retelling task (See Table 7). The differences on local coherence according to mode of discourse was not significant (p= 1.000, p= .537) for either group. The range of local coherence ratings for the group with CHI was 3.00-5.00 for oral and writing (mean= 4.00, sd= .82). The range of local coherence ratings for the control group was 3.00-5.00 while speaking (mean= 3.50, sd= 1.00) and 3.00-5.00 for written tasks (mean= 4.00, sd= 1.15).

Personal narrative.

When looking at the first research question, the participant and control groups received similar ratings of local coherence while speaking and writing during the personal narrative task (See Table 7); differences were not significant (oral p= .670, written p= .595). The range of local coherence ratings for the group with CHI was 3.00-4.00 for oral (mean= 3.50, sd= .58) and 3.00-5.00 for written tasks (mean= 4.25, sd= .96). The range of local coherence ratings for the control group was 3.00-5.00 during oral tasks (mean= 3.75, sd= .96). One control did poorly on this rating while writing, resulting in a range of 2.00-5.00 (mean= 3.75, sd= 1.50).

When looking at the second research question, the control group received equal ratings of local coherence while speaking and writing, while the participants with CHI received lower ratings while speaking when compared to writing during the personal narrative task (See Table 7). The differences on local coherence according to mode of discourse was not significant ($\underline{p}$= .705, $\underline{p}$= 1.000) for either group. The range of local coherence ratings for the group with CHI was 3.00-4.00 for oral (mean= 3.50, sd= .58) and 3.00-5.00 for written tasks (mean= 4.25, sd= .96). The range of local coherence ratings for the control group was 3.00-5.00 during oral tasks (mean= 3.75, sd= .96). One control did poorly on this rating while writing, resulting in a range of 2.00-5.00 (mean= 3.75, sd= 1.50) while writing.

<u>Procedural.</u>

When looking at the first research question, the control group received higher local coherence ratings while speaking and writing as compared to the participants during the procedural task (See Table 7). These differences for oral discourse approached significance ($\underline{p}$= .072), but not for written discourse ($\underline{p}$= .215). The range of local coherence ratings for the group with CHI was 1.00-4.00 for speaking (mean= 2.75, sd= 1.50) and 1.00-5.00 for writing (mean= 3.50, sd= 1.73). The range of local coherence ratings for the control group was 4.00-5.00 for speaking (mean= 4.50, sd= .58) and 4.00-5.00 for writing (mean= 4.75, sd= .50). The control group received the highest local coherence ratings while writing during the procedural task as compared to all other tasks; the CHI group received lowest local coherence ratings while speaking as compared to all other elicitation tasks.

When looking at the second research question, participants with CHI and the control group received lower ratings of local coherence for speaking than writing during the procedural task (See Table 7); however, differences on local coherence according to mode of discourse was not significant ($p= .537$, $p= .537$) for either group. The range of local coherence ratings for the CHI group was 1.00-4.00 for speaking (mean= 2.75, sd= 1.50) and 1.00-5.00 for writing (mean= 3.50, sd= 1.73). The range of local coherence ratings for the control group was 4.00-5.00 for speaking (mean= 4.50, sd= .58) and 4.00-5.00 for writing (mean= 4.75, sd= .50).

Table 7

Local Coherence Ratings as Measured by Relationship of each Successive CU (SD in parenthesis)

	Picture Description	Story Retelling	Personal Narrative	Procedural
Oral				
CHI	3.50 (.58)	4.00 (.82)	3.50 (.58)	2.75 (1.50)
Control	3.75 (.95)	3.50 (1.00)	3.75 (.96)	4.50 (.58)
Written				
CHI	3.25 (1.50)	4.00 (.82)	4.25 (.98)	3.50 (1.73)
Control	4.25 (.96)	4.00 (1.15)	3.75 (1.50)	4.75 (.50)

Note: SD= Standard deviation; CU= Communication unit; CHI= Closed head injury
Local coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

Significant differences in discourse due to group membership.

The first question evaluated whether a difference existed between the discourse of individuals with CHI and controls on measures of productivity, efficiency, and coherence. There was a significant difference between the two groups for global coherence ratings during the oral picture description task. The control group had higher global coherence ratings as compared to participants with CHI while speaking. There also was a significant difference between the participants with CHI and controls for oral productivity during the story retelling task. During this task, the controls were more productive, or expressed more ideas, than participants with CHI while speaking. For statistical information on measures and elicitation tasks, see Appendix A.

Significant differences between oral and written modes of discourse.

The second research question asked if measures of productivity, efficiency, and coherence vary according to oral and written modes of discourse for participants with CHI and controls. There were no significant differences according to mode of discourse for either participants with CHI or controls. For statistical information on measures and elicitation tasks, see Appendix A.

Third Research Question

The third research question evaluated whether there was a difference between participants with CHI and control subjects on measures of verbal working memory and selective attention. Selective attention and working memory are processes that are associated with the frontal lobes and expected to be impaired to some degree after CHI. Since narration is a skill which requires intact prefrontal lobe function, it is expected that selective attention and working memory skills may be important contributors to discourse performance.

Raw scores on the RMT and reading times from the Stroop were compared between the groups using a one-way ANOVA (See Table 8). There were no significant differences between the two groups on either verbal working memory scores and times from the Stroop (wm= 0.073, str= .089); however, these measures did approach significance. The control group received higher verbal working memory scores (mean= 108.00, range= 106-109, sd= 1.41) than the participants with CHI (mean= 97.75, range= 84-104, sd= 9.32). The control group also read faster during the Stroop test (mean= 16.31, range= 13.03-18.34 , sd= 2.41) than the participants with CHI (mean= 26.64, range= 18.88-41.00, sd= 9.91).

Table 8

Comparison of Verbal Working Memory Raw Scores and Stroop Times for Participants with Closed Head Injury vs. Controls

Source of Variation	Mean	Range	SD	F	p
Verbal Working Memory				4.726	.073
CHI	97.75	84-104	9.32		
Control	108.00	106-109	1.41		
Stroop				4.111	.089
CHI	26.64	18.88-41.00	9.91		
Control	16.31	13.03-18.34	2.41		

Note: SD= Standard deviation; CHI= Closed head injury

16.31, range= 13.03-18.34 , sd= 2.41) than the participants with CHI (mean= 26.64, range= 18.88-41.00, sd= 9.91).

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Comparison of Verbal Working Memory Raw Scores and Stroop Times for Participants with Closed Head Injury vs. Controls

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Control	108.00	106-109	1.41		
Stroop				4.111	.089
CHI	26.64	18.88-41.00	9.91		
Control	16.31	13.03-18.34	2.41		

Note: SD= Standard deviation; CHI= Closed head injury

CHAPTER V

Discussion

This study investigated the discourse performance of adolescents with a closed head injury and controls across four discourse elicitation tasks, using oral and written samples and a variety of discourse measures. The study also included additional cognitive measures as they related to discourse. Although several studies have investigated differences in oral and written discourse, this is the first study to use four different elicitation tasks within one study.

Differences in Discourse Due to Group Membership

The first questioned asked whether there was a difference between the discourse of individuals with CHI and controls on measures of productivity, efficiency, and coherence. There was a significant difference between the participants with CHI and controls for oral productivity during the story retelling task. During this task, the controls were more productive, or expressed more ideas, than participants with CHI while speaking. While speaking and writing, both groups were most productive during the story retelling task as compared to all other tasks. These findings agree with past research in that story retelling tasks result in longer narratives (Liles et al., 1989). Story retelling may be less demanding because the task provides structure for the narrative. Written productivity during the story retelling task approached significance between the groups. During the story retelling task, controls were more productive, or expressed more ideas, than controls while writing.

There were no significant differences between the CHI and control group for efficiency. However, discourse performance between the two groups approached significance for the oral and written pictured description task and oral story retelling task. During the pictured activity description task, participants used fewer words per each idea than controls while speaking and writing. Participants during the story retelling task used fewer words to express ideas (more efficient) while speaking when compared to controls. Both groups were most efficient in speaking and writing during the story retelling task.

There also was a significant difference between the two groups for global coherence ratings during the oral picture description task. Previous researchers are in agreement that pictured description may be a difficult cognitive task because it requires the generation of ideas due to a lack of structure provided (Dennis & Barnes, 1990; Stout et al., 2000; Wilson & Proctor, 2000). The control group had higher global coherence ratings when compared to participants with CHI while speaking. Global coherence is an indication of staying on topic. Both groups received highest global coherence ratings while speaking and writing during the story retelling task. Previous research has not found a significant difference in global coherence ratings between CHI and control groups (Wilson & Proctor, 2000).

There were no significant differences between the CHI and control group for local coherence. However, between group differences for oral local coherence approached significance during the procedural task. During the procedural task, the control group received higher local coherence ratings while speaking when compared to the participants with CHI. For oral local coherence, participants received highest ratings during the story retelling task, while controls received lowest local coherence ratings during the story retelling task. For written local coherence, participants received highest ratings during the personal narrative, while controls received lowest local coherence ratings during the personal narrative task.

Differences Between Oral and Written Modes of Discourse

The second research question evaluated if the measures of productivity, efficiency, and coherence vary according to oral and written modes of discourse for participants with CHI and controls. There were no significant differences according to mode of discourse for either group. Participants with CHI and controls were more productive while speaking. Oral and written differences that approached significance included oral productivity during the pictured activity description task for the participants with CHI, who produced more ideas while speaking than when writing.

The efficiency measure was the most consistent between oral and written modes of discourse with the exception of the procedural tasks. Both groups received highest global coherence ratings while writing. The control group also received highest local coherence ratings while writing as compared to speaking.

Differences in Cognitive Skills According to Group Membership

Raw scores on the RMT and reading times from the Stroop were compared between the groups. There were no significant differences on either verbal working memory scores or reading times from the Stroop; however, these group differences did approach significance. The control group received higher verbal working memory scores than the participants with CHI. The control group also read faster during the Stroop test than the participants with CHI. Although there were no significant differences between the groups, the control group performed better during each task.

Practical Implications

Research findings regarding the discourse performance of individuals with CHI have been inconsistent. The most discriminating discourse measures in this study were productivity and global coherence. Story retelling appears to be an easier discourse task for the CHI group. During this study, the CHI group was most productive, efficient, and received highest global coherence ratings during the story retelling task while speaking and writing. Participants with CHI were more productive in oral tasks than in written. The CHI group maintained topic best during written discourse.

Limitations of the Current Study

The current study evaluated four individuals with CHI. A larger sample size might have yielded more significant findings. Results from the control group showed greater variation than expected. A more sensitive test battery for controls should also be considered. While controls used in this study did not identify previous learning difficulties, their performance did not conform to expected standards.

Future Research

Future research should utilize a larger sample size when investigating discourse performance of individuals with CHI. Perhaps more important than differences between CHI and controls, investigators should focus on task demands of discourse relative to the CHI population. Additional research needs to be conducted to investigate cognitive factors and discourse.

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Appendix A

Comparison of Participants with Closed Head Injury vs. Controls for Productivity during Oral and Written Discourse during Pictured Activity Description

Group	Mean # of CUs	Range	SD	F	p
Oral				2.053	.202
CHI	6.75	6.00-8.00	0.96		
Control	10.75	6.00-18.00	5.50		
Written				3.769	.100
CHI	5.00	3.00-6.00	1.41		
Control	8.50	5.00-13.00	3.32		

Note: SD= Standard deviation; #= Number; CU= Communication Unit; CHI= Closed Head Injury

Comparison of Participants with Closed Head Injury vs. Controls for Efficiency during Oral and Written Discourse during Pictured Activity Description

Group	MLCU	Range	SD	F	p
Oral				4.205	.086
CHI	8.57	7.00-12.00	2.40		
Control	11.19	10.14-11.94	11.19		
Written				4.848	.070
CHI	8.98	7.50-10.60	1.47		
Control	11.78	9.25-13.88	2.07		

Note: SD= Standard deviation; MLCU= Mean length of communication unit in words; CHI= Closed Head Injury

Appendix A (continued)

Comparison of Participants with Closed Head Injury vs. Controls for Global Coherence during Oral and Written Discourse during Pictured Activity Description

Group	Mean Rating	Range	SD	F	p
Oral					
CHI	4.00	4.00-4.00	0.00	9.000	.024*
Control	4.75	4.00-5.00	0.50		
Written				2.000	.207
CHI	4.25	4.00-5.00	0.50		
Control	4.75	3.00-5.00	0.50		

Note: SD= Standard deviation; CHI= Closed Head Injury; *= Significant at <.05

Comparison of Participants with Closed Head Injury vs. Controls for Local Coherence during Oral and Written Discourse during Pictured Activity Description

Group	Mean Rating	Range	SD	F	p
Oral					
CHI	3.50	3.00-4.00	0.58	0.064	.809
Control	3.75	1.00-5.00	0.95		
Written				1.263	.304
CHI	3.25	2.00-5.00	1.50		
Control	4.25	3.00-5.00	0.96		

Note: SD= Standard deviation; CHI= Closed Head Injury

Appendix A (continued)

Comparison of Participants with Closed Head Injury vs. Controls for Productivity during Oral and Written Discourse during Story Retelling

Group		Mean # of CUs	Range	SD	F	p
Oral					7.994	.030*
	CHI	9.25	5.00-15.00	4.35		
	Control	19.75	12.00-25.00	6.02		
Written					4.742	.072
	CHI	7.50	4.00-10.00	2.65		
	Control	16.25	10.00-27.00	7.59		

Note: SD= Standard deviation; #= Number; CU= Communication Unit; CHI= Closed Head Injury; *= Significant at <.05

Appendix A (continued)

Comparison of Participants with Closed Head Injury vs. Controls for Efficiency during Oral and Written Discourse during Story Retelling

Group	MLCU	Range	SD	F	p
Oral				4.420	.080
CHI	8.03	7.60-8.60	.042		
Control	9.42	7.80-10.61	1.25		
Written				.427	.538
CHI	8.70	7.57-9.78	0.90		
Control	8.24	6.78-9.38	1.08		

Note: SD= Standard deviation; MLCU= Mean length of communication unit in words; CHI= Closed Head Injury

Comparison of Participants with Closed Head Injury vs. Controls for Global Coherence during Oral and Written Discourse during Story Retelling

Group	Mean Rating	Range	SD	F	p
Oral				3.000	.134
CHI	4.50	4.00-5.00	0.57		
Control	5.00	5.00-5.00	0.00		
Written				1.000	.356
CHI	4.75	4.00-5.00	0.50		
Control	5.00	5.00-5.00	0.00		

Note: SD= Standard deviation; CHI= Closed Head Injury

Appendix A (continued)

Comparison of Participants with Closed Head Injury vs. Controls for Local Coherence during Oral and Written Discourse during Story Retelling

Group	Mean Rating	Range	SD	F	p
Oral				.600	.468
CHI	4.00	3.00-5.00	0.82		
Control	3.50	3.00-5.00	1.00		
Written				.000	1.000
CHI	4.00	3.00-5.00	0.82		
Control	4.00	3.00-5.00	1.15		

Note: SD= Standard deviation; CHI= Closed Head Injury

Comparison of Participants with Closed Head Injury vs. Controls for Productivity during Oral and Written Discourse during Personal Narrative

Group	Mean # of CUs	Range	SD	F	p
Oral				.901	.379
CHI	7.00	2.00-16.00	6.16		
Control	10.25	7.00-14.00	2.99		
Written				2.483	.166
CHI	5.25	3.00-8.00	2.63		
Control	8.25	5.00-11.00	2.75		

Note: SD= Standard deviation; #= Number; CU= Communication Unit; CHI= Closed Head Injury

Appendix A (continued)

Comparison of Participants with Closed Head Injury vs. Controls for Efficiency during Oral and Written Discourse during Personal Narrative

Group	MLCU	Range	SD	F	p
Oral				.139	.723
CHI	14.21	10.00-22.00	5.37		
Control	12.79	6.86-18.86	5.38		
Written				.014	.910
CHI	12.19	9.38-14.67	2.23		
Control	12.32	11.70-13.00	0.55		

Note: SD= Standard deviation; MLCU= Mean length of communication unit in words; CHI= Closed Head Injury

Comparison of Participants with Closed Head Injury vs. Controls for Global Coherence during Oral and Written Discourse during Personal Narrative

Group	Mean Rating	Range	SD	F	p
Oral				.000	1.000
CHI	4.25	4.00-5.00	0.50		
Control	4.25	4.00-5.00	0.50		
Written				.000	1.000
CHI	4.50	4.00-5.00	0.58		
Control	4.50	4.00-5.00	0.58		

Note: SD= Standard deviation; CHI= Closed Head Injury

Appendix A (continued)

Comparison of Participants with Closed Head Injury vs. Controls for Local Coherence during Oral and Written Discourse during Personal Narrative

Group		Mean Rating	Range	SD	F	p
Oral					.200	.670
	CHI	3.50	3.00-4.00	0.58		
	Control	3.75	3.00-5.00	0.96		
Written					.316	.595
	CHI	4.25	3.00-5.00	0.98		
	Control	3.75	2.00-5.00	1.50		

Note: SD= Standard deviation; CHI= Closed Head Injury

Appendix A (continued)

Comparison of Participants with Closed Head Injury vs. Controls for Productivity during Oral and Written Discourse during Procedural Task

Group		Mean # of CUs	Range	SD	F	p
Oral					2.228	.186
	CHI	4.75	4.00-5.00	0.50		
	Control	8.50	2.00-14.00	5.00		
Written					3.628	.105
	CHI	4.25	2.00-5.00	1.50		
	Control	8.50	4.00-13.00	4.20		

Note: SD= Standard deviation; #= Number; CU= Communication Unit; CHI= Closed Head Injury

Appendix A (continued)

Comparison of Participants with Closed Head Injury vs. Controls for Efficiency during Oral and Written Discourse during Procedural Task

Group	MLCU	Range	SD	F	p
Oral				.730	.426
CHI	11.34	7.20-15.60	4.45		
Control	14.41	6.20-18.50	5.64		
Written				1.956	.211
CHI	15.10	6.40-21.50	6.31		
Control	10.44	7.67-12.10	2.10		

Note: SD= Standard deviation; MLCU= Mean length of communication unit in words; CHI= Closed Head Injury

Comparison of Participants with Closed Head Injury vs. Controls for Global Coherence during Oral and Written Discourse during Procedural Task

Group	Mean Rating	Range	SD	F	p
Oral				2.000	.207
CHI	4.25	4.00-5.00	0.50		
Control	4.75	4.00-5.00	0.50		
Written				3.000	.134
CHI	4.50	4.00-5.00	0.58		
Control	5.00	5.00-5.00	0.00		

Note: SD= Standard deviation; CHI= Closed Head Injury

Appendix A (continued)

Comparison of Participants with Closed Head Injury vs. Controls for Local Coherence during Oral and Written Discourse during Procedural Task

Group		Mean Rating	Range	SD	F	p
Oral					4.742	.072
	CHI	2.75	1.00-4.00	1.50		
	Control	4.50	4.00-5.00	0.58		
Written					1.923	.215
	CHI	3.50	1.00-5.00	1.73		
	Control	4.75	4.00-5.00	0.50		

Note: SD= Standard deviation; CHI= Closed Head Injury

Comparison of Oral and Written Discourse for Productivity for Participants with Closed Head Injury and Controls during Pictured Activity Description

Group		Mean # CUs	Range	SD	F	p
CHI					4.200	.086
	Oral	6.75	6.00-8.00	0.96		
	Written	5.00	3.00-6.00	1.41		
Control					.491	.510
	Oral	10.75	6.00-18.00	5.50		
	Written	8.50	5.00-13.00	3.32		

Note: SD= Standard deviation; #= number; CU= Communication unit; CHI= Closed head injury

Appendix A (continued)

Comparison of Oral and Written Discourse for Productivity for Participants with Closed Head Injury and Controls during Story Retelling

Group		Mean # CUs	Range	SD	F	p
CHI					.473	.517
	Oral	9.25	5.00-15.00	4.35		
	Written	7.50	4.00-10.00	2.65		
Control					.522	.497
	Oral	19.75	12.00-25.00	6.02		
	Written	16.25	10.00-27.00	7.59		

Note: SD= Standard deviation; #= number; CU= Communication unit; CHI= Closed head injury

Comparison of Oral and Written Discourse for Productivity for Participants with Closed Head Injury and Controls during Personal Narrative

Group		Mean # CUs	Range	SD	F	p
CHI					.973	.362
	Oral	7.00	2.00-16.00	6.16		
	Written	5.25	3.00-8.00	2.63		
Control					.970	.363
	Oral	10.25	7.00-14.00	2.99		
	Written	8.25	5.00-11.00	2.75		

Note: SD= Standard deviation; #= number; CU= Communication unit; CHI= Closed head injury

Appendix A (continued)

Comparison of Oral and Written Discourse for Productivity for Participants with Closed Head Injury and Controls during Procedural Task

Group		Mean # CUs	Range	SD	F	p
CHI					.400	.550
	Oral	4.75	4.00-5.00	0.50		
	Written	4.25	2.00-5.00	1.50		
Control					.000	1.000
	Oral	8.50	2.00-14.00	5.00		
	Written	8.50	4.00-13.00	4.20		

Note: SD= Standard deviation; #= number; CU= Communication unit; CHI= Closed head injury

Comparison of Oral and Written Discourse for Efficiency for Participants with Closed Head Injury and Controls during Pictured Activity Description

Group		MLCU	Range	SD	F	p
CHI					.085	.781
	Oral	8.57	7.00-12.00	2.40		
	Written	8.98	7.50-10.60	1.47		
Control					.283	.614
	Oral	11.19	10.14-11.94	0.86		
	Written	11.78	9.25-13.88	2.07		

Note: SD= Standard deviation; #= number; MLCU= Mean length of communication unit in words; CHI= Closed head injury

Appendix A (continued)

Comparison of Oral and Written Discourse for Efficiency for Participants with Closed Head Injury and Controls during Story Retelling

Group		MLCU	Range	SD	F	p
CHI					1.839	.224
	Oral	8.02	7.60-8.60	0.42		
	Written	8.70	7.57-9.78	0.90		
Control					2.015	.206
	Oral	9.42	7.80-10.61	1.25		
	Written	8.24	6.78-9.38	1.08		

Note: SD= Standard deviation; #= number; MLCU= Mean length of communication unit in words; CHI= Closed head injury

Comparison of Oral and Written Discourse for Efficiency for Participants with Closed Head Injury and Controls during Personal Narrative

Group		MLCU	Range	SD	F	p
CHI					.001	.972
	Oral	14.21	10.00-22.00	5.37		
	Written	12.19	9.38-14.37	2.23		
Control					.030	.868
	Oral	12.79	6.86-18.86	5.38		
	Written	12.32	11.70-13.00	0.55		

Note: SD= Standard deviation; #= number; MLCU= Mean length of communication unit in words; CHI= Closed head injury

Appendix A (continued)

Comparison of Oral and Written Discourse for Efficiency for Participants with Closed Head Injury and Controls during Procedural Task

Group		MLCU	Range	SD	F	p
CHI					.945	.369
	Oral	11.34	7.20-15.60	4.45		
	Written	15.09	6.40-21.50	6.31		
Control					1.739	.235
	Oral	14.41	6.20-18.50	5.64		
	Written	10.44	7.67-12.10	2.09		

Note: SD= Standard deviation; #= number; MLCU= Mean length of communication unit in words; CHI= Closed head injury

Comparison of Oral and Written Discourse for Global Coherence for Participants with Closed Head Injury and Controls during Pictured Activity Description

Group		Mean Rating	Range	SD	F	p
CHI					1.000	.356
	Oral	4.00	4.00-4.00	0.00		
	Written	4.25	4.00-5.00	0.50		
Control					.000	1.000
	Oral	4.75	4.00-5.00	0.50		
	Written	4.75	3.00-5.00	0.50		

Note: SD= Standard deviation; #= number; CHI= Closed head injury
Global coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

Appendix A (continued)

Comparison of Oral and Written Discourse for Global Coherence for Participants with Closed Head Injury and Controls during Story Retelling

Group		Mean Rating	Range	SD	F	p
CHI					.429	.537
	Oral	4.50	4.00-5.00	0.57		
	Written	4.75	4.00-5.00	0.50		
Control						
	Oral	5.00	5.00-5.00	0.00		
	Written	5.00	5.00-5.00	0.00		

Note: SD= Standard deviation; #= number; CHI= Closed head injury
Global coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

Comparison of Oral and Written Discourse for Global Coherence for Participants with Closed Head Injury and Controls during Personal Narrative

Group		Mean Rating	Range	SD	F	p
CHI					1.000	.356
	Oral	4.25	4.00-5.00	0.50		
	Written	4.50	4.00-5.00	0.58		
Control					.429	.537
	Oral	4.25	4.00-5.00	0.50		
	Written	4.50	4.00-5.00	0.58		

Note: SD= Standard deviation; #= number; CHI= Closed head injury
Global coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

Appendix A (continued)

Comparison of Oral and Written Discourse for Global Coherence for Participants with Closed Head Injury and Controls during Procedural Task

Group		Mean Rating	Range	SD	F	p
CHI					.429	.537
	Oral	4.25	4.00-5.00	0.50		
	Written	4.50	4.00-5.00	0.58		
Control					1.000	.356
	Oral	4.75	4.00-5.00	0.50		
	Written	5.00	5.00-5.00	0.00		

Note: SD= Standard deviation; #= number; CHI= Closed head injury
Global coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

Comparison of Oral and Written Discourse for Local Coherence for Participants with Closed Head Injury and Controls during Pictured Activity Description

Group		Mean Rating	Range	SD	F	p
CHI					.097	.766
	Oral	3.50	3.00-4.00	0.58		
	Written	3.25	2.00-5.00	1.50		
Control					.222	.654
	Oral	3.75	1.00-5.00	1.89		
	Written	4.25	3.00-5.00	0.96		

Note: SD= Standard deviation; #= number; CHI= Closed head injury
Local coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

Appendix A (continued)

Comparison of Oral and Written Discourse for Local Coherence for Participants with Closed Head Injury and Controls during Story Retelling

Group		Mean Rating	Range	SD	F	p
CHI					.000	1.000
	Oral	4.00	3.00-5.00	0.82		
	Written	4.00	3.00-5.00	0.82		
Control					.429	.537
	Oral	3.50	3.00-5.00	1.00		
	Written	4.00	3.00-5.00	1.15		

Note: SD= Standard deviation; #= number; CHI= Closed head injury
Local coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

Comparison of Oral and Written Discourse for Local Coherence for Participants with Closed Head Injury and Controls during Personal Narrative

Group		Mean Rating	Range	SD	F	p
CHI					.158	.705
	Oral	3.50	3.00-4.00	0.58		
	Written	4.25	3.00-5.00	0.96		
Control					.000	1.000
	Oral	3.75	3.00-5.00	0.96		
	Written	3.75	2.00-5.00	1.50		

Note: SD= Standard deviation; #= number; CHI= Closed head injury
Local coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

Appendix A (continued)

Comparison of Oral and Written Discourse for Local Coherence for Participants with Closed Head Injury and Controls during Procedural Task

Group		Mean Rating	Range	SD	F	p
CHI					.429	.537
	Oral	2.75	1.00-4.00	1.50		
	Written	3.50	1.00-5.00	1.73		
Control					.429	.537
	Oral	4.50	4.00-5.00	0.58		
	Written	4.75	4.00-5.00	0.50		

Note: SD= Standard deviation; #= number; CHI= Closed head injury
Local coherence was rated on a scale of 1-5, with 5 indicating the best performance and 1 the worst.

Appendix B

CONSENT TO PARTICIPATE IN RESEARCH

Comparing Discourse According to Elicitation Procedure

You are invited to participate in a research study conducted by Aimee Wheat and Dr. Brenda Wilson, from the *Communication Disorders and Sciences department* at Eastern Illinois University.
Your participation in this study is entirely voluntary. Please ask questions about anything you do not understand, before deciding whether or not to participate.

• PURPOSE OF THE STUDY

The purpose of this study will be to compare the discourse performance of five adolescents with a head injury to matched controls according to the influence of the elicitation task and mode of expression, using measures of productivity, efficiency, and coherence. The relationship of cognitive skills to discourse performance will also be assessed.

• PROCEDURES

If you volunteer to participate in this study, you will be asked to:

- *Provide speech and writing samples and have your hearing, language, and memory evaluated.*
- *Each testing session will take approximately 2 hours.*
- *Oral samples will be audiotaped so that the researcher can go back and transcribe each discourse sample.*

• POTENTIAL RISKS AND DISCOMFORTS

- *There are no foreseeable risks or harms from participating in this research project.*

• POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

- *Participants will be given results of testing materials.*

• CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of assigning a number to each participant upon completion of testing/assessments. All records and forms and audio tapes will be assigned the same number. Only the researcher and faculty supervisor will access the research materials. All data and materials will be retained in the faculty supervisor's office.

• PARTICIPATION AND WITHDRAWAL

Participation in this research study is voluntary and not a requirement or a condition for being the recipient of benefits or services from Eastern Illinois University or any other organization sponsoring the research project. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind or loss of benefits or services to which you are otherwise entitled.
You may also refuse to answer any questions you do not want to answer. There is no penalty if you withdraw from the study and you will not lose any benefits to which you are otherwise entitled.

- **IDENTIFICATION OF INVESTIGATORS**

If you have any questions or concerns about this research, please contact:

Brenda Wilson, PhD/CCC-SLP
Communication Disorders & Sciences
Eastern Illinois University
600 Lincoln Avenue
Charleston, IL 61920
Home phone: 217-345-3688
Work phone: 217-581-7452
Email: bmwilson@eiu.edu

Aimee Wheat
1507 Woodlawn Drive, Apt. 6
Charleston, IL 61920
Cell phone: 217-549-3760
Email: aimee_2000@hotmail.com

- **RIGHTS OF RESEARCH SUBJECTS**

If you have any questions or concerns about the treatment of human participants in this study, you may call or write:

Institutional Review Board
Eastern Illinois University
600 Lincoln Ave.
Charleston, IL 61920
Telephone: (217) 581-8576
E-mail: eiuirb@www.eiu.edu

You will be given the opportunity to discuss any questions about your rights as a research subject with a member of the IRB. The IRB is an independent committee composed of members of the University community, as well as lay members of the community not connected with EIU. The IRB has reviewed and approved this study.

I voluntarily agree to participate in this study. I understand that I am free to withdraw my consent and discontinue my participation at any time. I have been given a copy of this form.

____
Printed Name of Participant

________________________________ ____________________
Signature of Participant Date

I hereby consent to the participation of ________________________________, a minor/subject in the investigation herin described. I understand that I am free to withdraw my consent and discontinue my child's participation at any time.

________________________________ ________________________

Signature of Minor/Handicapped Subject's Parent or Guardian Date

I, the undersigned, have defined and fully explained the investigation to the above subject.

________________________________ ________________________

Signature of Investigator Date

I, the undersigned, have defined and fully explained the investigation to the above subject.

________________________________ ________________________

Signature of Investigator Date